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FIRST PROGRESS REPORT UNDER
THE 1994 CANADA-ONTARIO AGREEMENT
respecting the
GREAT LAKES BASIN ECOSYSTEM



PARTNERSHIPS

for the Great Lakes



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Government
Publications

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FIRST PROGRESS REPORT UNDER THE 1994 CANADA-ONTARIO AGREEMENT

RESPECTING THE GREAT LAKES BASIN ECOSYSTEM

In today's world it is increasingly more important that information be available through electronic media.

Environment Canada's Great Lakes Information Management Resource (GLIMR) operates within the World Wide Web and can be located under the Uniform Resource Locator (URL)
<http://www.cciw.ca/glimr/intro.html>. GLIMR contains an index of programs, publications and databases on the Great Lakes and can be used to access Environment Canada's national Green Lane Network as well as additional environmental networks operating within the Great Lakes basin.

INTRODUCTION

This report summarizes the progress made by federal and Ontario government agencies and their partners since the Canada-Ontario Agreement (COA) Respecting the Great Lakes Basin Ecosystem was signed in July 1994.

The 1994 COA is the fourth such arrangement the two governments have entered since 1971. It provides the framework for systematic and strategic coordination of shared federal and provincial responsibilities for environmental management in the Great Lakes basin, and of Canadian efforts to fulfil Canada's obligations under the Great Lakes Water Quality Agreement (GLWQA).

The COA of 1994 sets out a six-year plan of action that establishes priorities, targets and schedules for the environmental issues of current concern in the basin, and for Canada's GLWQA commitments.

This report documents the progress made not only in Canada's domestic Great Lakes programs, but also in joint Canada-United States activities related to the GLWQA. The report serves, therefore, as a means by which Canada can inform the International Joint Commission (IJC) of the scope and progress of Canadian environmental programs in the Great Lakes basin, as required on a biennial basis under the GLWQA.



THE CANADIAN APPROACH

The 1994 COA takes a results-oriented approach that identifies more than 55 targets to be achieved during the six-year term of the Agreement, i.e., to the year 2000. These targets address three main objectives:

- **Restore Degraded Areas**

Develop initiatives to continue the restoration of degraded areas throughout the Great Lakes basin, with emphasis on priority activities under the Remedial Action Plan (RAP) program to restore 60 per cent of impaired beneficial uses in Canada's 17 designated Areas of Concern.

- **Prevent and Control Pollution**

Work with producers and sources of pollutants to establish schedules and to achieve significant interim reductions (90 per cent by 2000) in the releases of persistent, bioaccumulative and toxic substances.

- **Conserve and Protect Human and Ecosystem Health**

Actions to promote health, reduce the risks of human exposure to environmental contaminants, and to conserve and protect habitat and fish and wildlife communities.

The environmental challenges in the Great Lakes are, to a large extent, the cumulative result of human activity in the basin. Progress in restoring and maintaining the integrity of the ecosystem will require the combined efforts of all levels of society including government, business, industry, agriculture and individual citizens.

The 1994 COA stresses the importance of partnerships, collaborative arrangements and collective action in development and implementation of programs to tackle these cumulative effects. While this report addresses the specific programs undertaken by both the federal and Ontario government agencies, it also acknowledges the extensive actions

taken by organizations and individuals which contribute to the achievement of the objectives and targets under COA.

In addition, a substantial science effort underpins the initiatives being taken through COA. Science determines our ability to characterize essential ecological processes, define and anticipate environmental problems, establish priorities, and design proactive and remedial solutions. Numerous federal and provincial research projects and monitoring and surveillance activities directly support the implementation of COA.

For example, during the past year more than 80 science-based projects and activities supported COA objectives. One such project, a cooperative effort that focused on Lake Erie, involved Environment Canada, Department of Fisheries and Oceans, the Ontario Ministry of Natural Resources and several universities (Toronto, Windsor, Waterloo, Trent and others).

A COA management framework has been set in place to coordinate and monitor the efforts of 11 federal departments and provincial ministries to achieve measurable progress towards the objectives.

The framework incorporates activities to be undertaken jointly with the United States. Priorities here include the development of lakewide management plans, the Lake Superior Binational Program, and a binational strategy for persistent toxic substances.

In large measure, priorities continue to focus on problems created by past abuses. There are, however, an increasing number of opportunities and initiatives being brought forward that involve pollution prevention and conservation. This indicates an encouraging movement away from the historic "react and cure" or catch-up modes of action to a more comprehensive approach that is anticipatory and preventative.

MANAGEMENT FRAMEWORK

FOR THE CANADA-ONTARIO AGREEMENT RESPECTING THE GREAT LAKES BASIN ECOSYSTEM

CANADA-ONTARIO AGREEMENT REVIEW COMMITTEE

Canada

- Environment Canada
- Health Canada
- Department of Fisheries & Oceans
- Agriculture & Agri-Food Canada

Ontario

- Ontario Ministry of Environment & Energy
- Ontario Ministry of Natural Resources
- Ontario Ministry of Agriculture, Food & Rural Affairs

OBJECTIVE 1

Restore Degraded Areas

- Remedial Action Plans
- Capital Works
- Species & Habitat Rehabilitation
- Contaminated Sites
- Contaminated Sediments
- Groundwater
- Human Health

OBJECTIVE 2

Prevent & Control Pollution

- Priority Toxic Substances
- Hazardous Waste & Spills
- Pesticides
- Binational Initiatives
- Atmospheric Deposition

OBJECTIVE 3

Conserve & Protect Human & Ecosystem Health

- Lakewide Planning
- Habitat Conservation & Protected Areas
- Fish & Wildlife Conservation
- Human Health
- Climate Change
- Land & Water Use Management

RESULTS

This first progress report under COA is structured to parallel the commitments of the Agreement itself. Emphasis has been given to reporting on substantive results or progress rather than on activities or process. Nevertheless, given the complexity of some of the problems and the fact that many targets will require several years of effort to achieve, this first report also documents effort directed to establishing the clear accountabilities, baseline data and collaborative arrangements that form the basis for success.

It is important also to acknowledge that the 1994 COA integrated a number of federal and provincial activities already underway, while that Agreement was being negotiated and finalized. The following chart summarizes some key achievements made during that negotiation phase and in Year 1 of the COA.

Successful delivery of the diverse activities under COA involves a substantial commitment to the provision and sharing of information. A reading list of additional sources of information on the Great Lakes activities can be found in Appendix I.

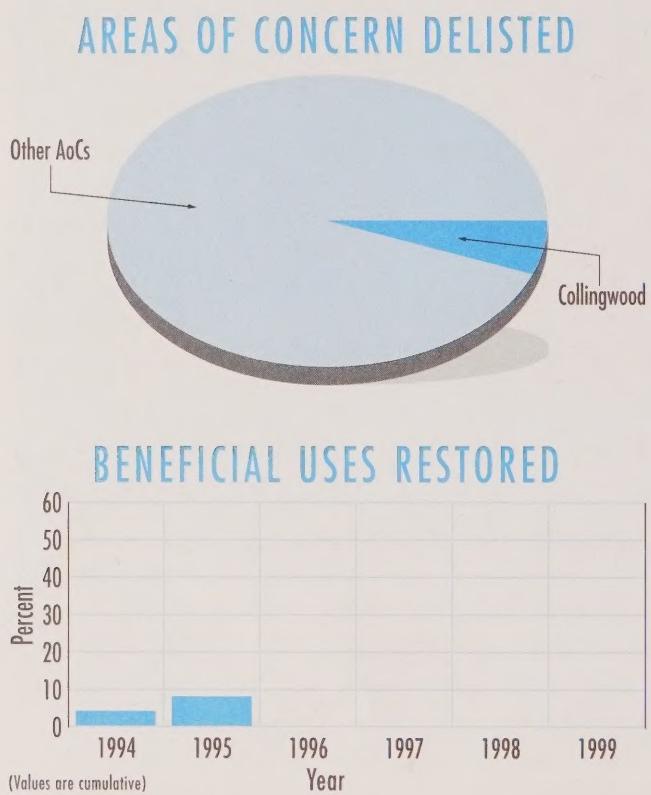
ENVIRONMENTAL HIGHLIGHTS 1993 – 1995

- September 1993 Ontario releases final regulations for the petroleum industrial sector under the Municipal-Industrial Strategy for Abatement (MISA)
- October 1993 Ontario bans five chlorinated pesticides whose residues are found in the Great Lakes
- November 1993 Ontario releases final regulations for the pulp and paper industrial sector under MISA
- April 1994 Canada announces the Great Lakes 2000 Program establishing federal funding commitments and priorities
- April 1994 Canada introduces the New Substances Notification Regulations which restrict the introduction of substances into Canada that may pose an environmental hazard
- July 1994 Canada and Ontario sign the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem
- August 1994 Ontario releases final regulations for the metal mining, industrial minerals and metal casting industrial sectors under MISA
- October 1994 Canada jointly hosts the first State of the Great Lakes Ecosystem Conference with the United States
- November 1994 Collingwood Harbour is delisted as an Area of Concern
- December 1994 Ontario designates three new Provincial Nature Reserves
- January 1995 Ontario amends the Conservation Lands Act to enable landowners to enter into conservation covenants and easements
- February 1995 Ontario releases final regulations for the organic and inorganic chemical manufacturing sectors under MISA
- April 1995 Ontario releases final regulations for the iron and steel manufacturing and the electric power generation sectors under MISA
- June 1995 Canada adopts the Toxic Substances Management Policy to guide and enhance federal actions on toxic substances
Canada releases the first National Pollutant Release Inventory Report
- June 1995 The first nesting of the Peregrine Falcon in southern Ontario in over 40 years marks a major success in the Canada/Ontario endangered species recovery effort
- July 1995 Canada announces a ban on lead shot for hunting migratory birds
- August 1995 Canada releases draft endangered species legislation

OBJECTIVE 1 RESTORE DEGRADED AREAS

Under this objective Canada and Ontario commit to the restoration of 60 per cent of impaired beneficial uses across all 17 Areas of Concern (AOCs) leading to the delisting of nine AOCs by the year 2000.

To date, one AOC, Collingwood Harbour, has been delisted, the first and only AOC on the Great Lakes to have achieved this distinction. Approximately eight per cent of impaired beneficial uses have been restored across all AOCs.



REMEDIAL ACTION PLANS

COA Target: Complete and submit all RAP Stage 2 reports to governments by the end of 1996. The governments will respond to all completed Stage 2 reports and submit them to the International Joint Commission by the end of 1997.

The Remedial Action Plan (RAP) Stage 2 Report describes locally defined goals and restoration targets, and the means by which these targets can be achieved, as determined by the RAP Team (technical experts from federal and provincial government agencies), in consultation with the public stakeholders.

A Stage 2 Report is prepared in two parts. The Stage 2A Report outlines a strategy for achieving environmental rehabilitation and restoration of beneficial uses through the implementation of a set of recommended remedial actions. A monitoring and surveillance plan to evaluate the success of the actions in meeting those targets is also incorporated into the document.

The Stage 2B Report includes an Implementation Annex, which specifies provincial and federal commitments to the plan and, to the extent possible, the commitments from all other implementors, including municipalities and the private sector. A fundamental element of this pivotal document is to clearly illustrate the linkage among the recommended actions, the restoration of beneficial uses, and the achievement of the locally-defined goals and targets. This strengthens the ability to secure the commitments required for implementation.

The Stage 2B Report (Stage 2A plus the Implementation Annex) constitutes the complete Stage 2 Report.

At the time the COA Agreement was signed, five Great Lakes Areas of Concern had submitted Stage 2A Reports to the governments. These were:

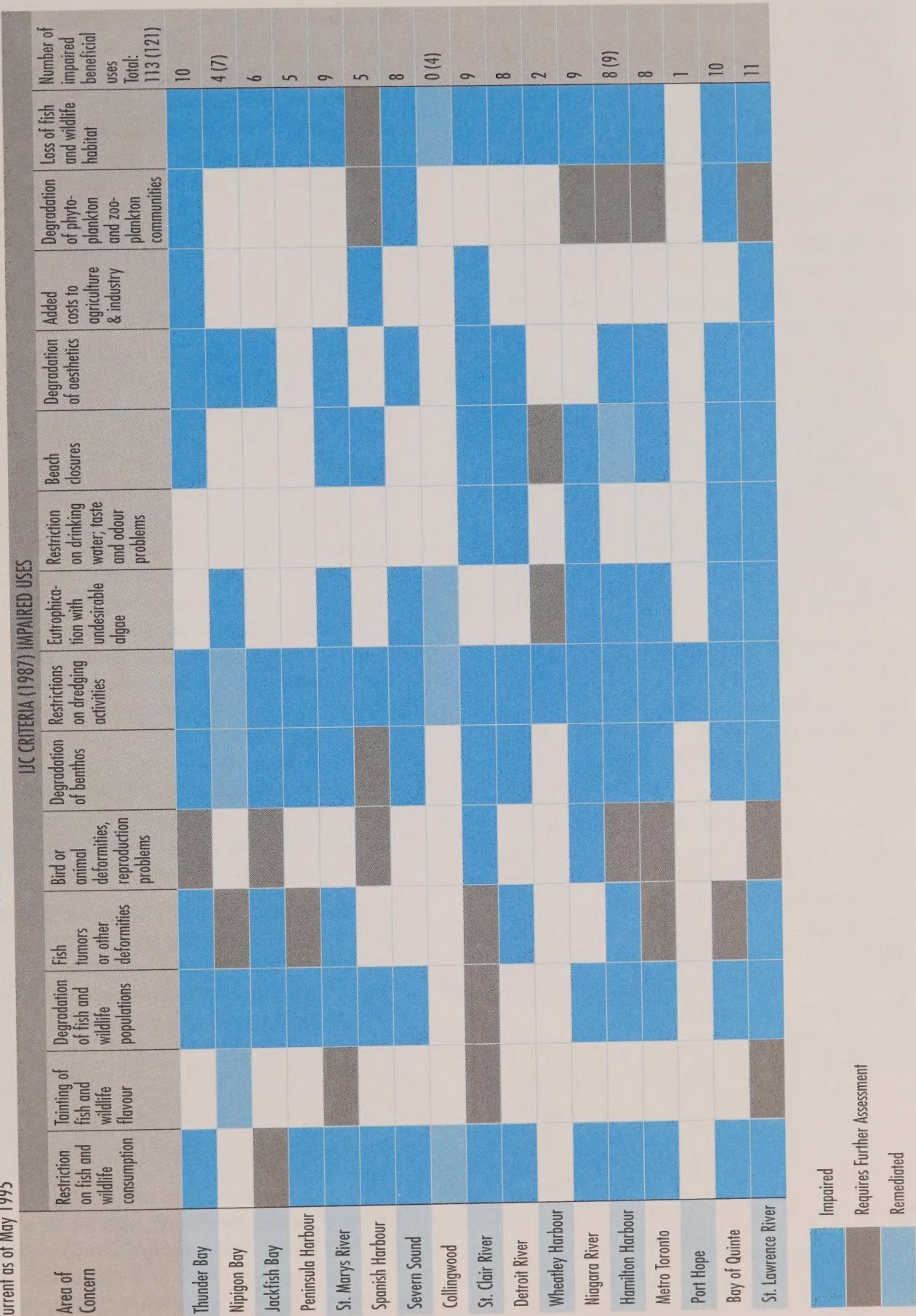
- Collingwood Harbour
- Hamilton Harbour
- Severn Sound
- Bay of Quinte
- Metro Toronto and Region

Since that time, the Governments have received Stage 2A Reports from:

- St. Clair River
- Niagara River
- Nipigon Bay

GREAT LAKES AREAS OF CONCERN REMEDIAL ACTION PLAN PROGRAM
IMPAIRMENT OF BENEFICIAL USES

Current as of May 1995



Following submission of the Stage 2A Report to the federal and provincial environment Ministers, the RAP Team and Public Advisory Committee receive formal responses from provincial and federal ministers detailing the extent to which they concur with the recommendations, the funding support in place and/or anticipated, and where this support can be acquired.

Canada and Ontario require that for formal submission to the IJC, the complete Stage 2 Report must record the commitments to, and a time frame for, implementation of the recommendations.

Government responses have now been completed for the following RAPs:

- Collingwood Harbour
- Hamilton Harbour
- Bay of Quinte

Provincial responses have been completed for:

- Severn Sound

The complete Stage 2 Report for **Collingwood Harbour** was transmitted to the IJC in 1994. Complete Stage 2 Reports for the **Hamilton Harbour, Severn Sound, Bay of Quinte** and **Nipigon Bay** are scheduled for transmittal in the fall of 1995.

These milestones signify that strategies to protect and restore conditions at these AOCs are in place. Furthermore, remediation activities are proceeding around the basin at almost all AOCs concurrent with plan development. Governments have shown their commitment to the RAP program through their concurrence, support, and funding for plan development and implementation.

*COA Targets: Establish organizational frameworks for individual AOCs to coordinate and facilitate implementation of local RAPs upon completion of Stage 2 reports.
Sustain public involvement and advisory programs for the implementation phase of RAPs.*

The following organizational frameworks have been established to facilitate RAP implementation.

Hamilton Harbour was the first AOC to set up an implementation arrangement. Community members incorporated themselves as the Bay Area Restoration Council (BARC) the main purpose of which "is the promoting, monitoring and assessing of the implementation of plans for environmental protection and restoration of Hamilton Harbour as outlined in the Hamilton Harbour Remedial Action Plan". The Bay Area Implementation Team,(which includes representatives of many of the agencies, sectors and individuals responsible for implementation), monitors and evaluates progress.

The **Collingwood Harbour RAP** Public Advisory Committee incorporated itself as PAC Inc. following the completion of the Stage 2 Report. It currently operates the RAP Environment Network, includes harbour and watershed rehabilitation projects, a resource centre, and public outreach and pollution prevention programs. The RAP Implementation Subcommittees have completed their tasks and only the Monitoring and Surveillance Subcommittee continues to operate. The Collingwood Harbour Action Team is composed of the Implementation Subcommittee chairs, the president of PAC Inc. and the RAP Coordinator. Their tasks are to meet annually to review monitoring data and to ensure that the environmental restoration achieved in order to delist the RAP persists through the pressures of new growth and development. PAC Inc. ceased to receive RAP program funding upon delisting, and is currently exploring the means by which it can remain self-sustaining.

The organization at **Bay of Quinte RAP** includes the Quinte RAP Implementation Steering Committee which comprises government representatives and the Implementation Advisory Committee. The latter group assumed the advisory and audit roles previously undertaken by the Public Advisory Committee (PAC) and assumed the additional task of promoting the RAP. Implementation Working Groups plan and act on specific actions recommended in the Stage 2 Report.

In **Severn Sound**, an alliance with the Wye Marsh Wildlife Centre enables the RAP Team and PAC to work collectively on RAP implementation while maintaining strong public involvement in the program.

Since the signing of the 1994 COA, eight per cent of the beneficial uses that were impaired have now been restored.

The Metro Toronto and Region, St. Clair River and Niagara River RAPs are currently in a stage of transition and are defining the most appropriate implementation structures. In all cases, the public involvement programs continue to be supported by the agencies, and implementation is ongoing.

These implementation frameworks are successful in achieving action to enhance environmental quality. One noteworthy illustration of the consequences of action around the basin is the eight per cent of impaired beneficial uses that have now been restored. By the year 2000, the aim is to restore an additional 52 per cent, for a total of 60 per cent, leading to the delisting of nine AOCs.

Since signing the COA agreement, Collingwood Harbour was the first AOC on the Great Lakes to be delisted, in cooperation with the IJC. In September 1994, the IJC Commissioners advised the governments of their concurrence that Collingwood Harbour no longer had the attributes of an Area of Concern.

Collingwood Harbour was the first Area of Concern on the Great Lakes to be delisted in November 1994.

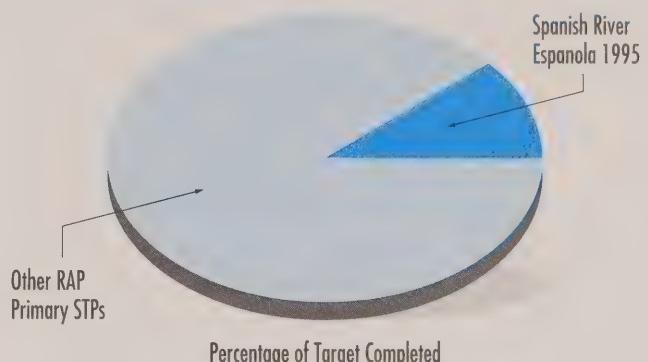
COA Target: By 1995, establish cooperative mechanisms, including environmental surveillance and monitoring, to track progress towards delisting on all 17 AOCs.

RAP Coordinators are presently completing five-year work plans which will identify the surveillance and monitoring activities necessary to demonstrate restoration of impaired beneficial uses, and the achievement of COA targets. Current program emphasis is on the harmonization of Great Lakes ambient monitoring programs between the federal and provincial governments, and the development of partnerships with other agencies and local communities for monitoring of RAP implementation.

CAPITAL WORKS

COA Target: Upgrade eight RAP primary sewage treatment plants to secondary treatment and optimize effluent quality and sludge generation at a further 12 plants in AOCs.

UPGRADING SEWAGE TREATMENT PLANTS IN AREAS OF CONCERN



The eight sewage treatment plants (STPs) identified for upgrading involve seven AOCs: Thunder Bay, Nipigon Bay (two plants), St. Marys River, Spanish River, St. Clair River, Detroit River and the St. Lawrence River. Progress for each project ranges from yet-to-be-started (Red Rock, Nipigon and Sault Ste. Marie), to undertaking planning (Cornwall, Windsor Westerly and Thunder Bay), to planning completed (Sarnia), to fully constructed (Espanola) in 1995.

Projects at seventeen plants in eight AOCs have been initiated to optimize effluent quality and sludge generation (Spanish Harbour, Severn Sound, Collingwood Harbour, St. Clair River, Detroit River, Hamilton Harbour, Metropolitan Toronto, and Bay of Quinte).

Optimization studies have been completed in six of the eight AOCs. Benefits derived from these studies include: reduced discharges of pollutants into the Great Lakes; savings in capital and operating costs; and the upgrading of technical and administrative skills of sewage treatment plant staff. For example:

- In Collingwood Harbour, the plant optimization study recommended that an on-line phosphorus analyzer, coupled with an alum dosing control, would enable the secondary treatment plant to

achieve the phosphorus removal efficiency of a tertiary plant. This saved the Town of Collingwood the \$8-10 million required to add a tertiary plant process unit.

COA Target: Enhance phosphorus removal at 15 sewage treatment plants in AOCs by modifying or adding to existing phosphorus controls.

Projects at nine plants in four AOCs (Severn Sound, Collingwood Harbour, Hamilton Harbour, and Bay of Quinte) are underway to enhance phosphorus removal. This includes the Trenton plant which has been recently upgraded with new technology to meet the new RAP target. The Collingwood plant is already achieving the RAP target for phosphorus.

COA Target: Undertake 25 stormwater quality pilot projects in AOCs.

Stormwater quality projects have been initiated in three Areas of Concern. Nipigon Bay is involved in planning a stormwater quality pond and Niagara Falls has instituted a voluntary participation program for reducing sewer flows by disconnecting roof drains.

In Metropolitan Toronto AOC, there are 12 ongoing stormwater quality pilot projects. These projects range from stormwater management strategy development for subwatersheds, to evaluation of new and conventional technologies for stormwater management. Technologies being evaluated include multi-staged stormwater quality ponds for removing solids and associated contaminants; separators for removing oil and sediments from stormwater; curtained-off sections of lakes where large volumes of stormwater runoff are captured, stored, treated and discharged; and an exfiltration system which channels stormwater into perforated storm sewer pipes for percolation to the underlying permeable soils.

Other projects include evaluating wetlands for stormwater runoff treatment in areas where wetlands have formed as a result of the stormwater inflow, and promotional activities to encourage the use of better practices at the community level so that the amount of contaminants in stormwater runoff is reduced.

COA Target: Abate 40 per cent of combined sewer overflows in AOCs by implementing municipal Pollution Control Plans.

Pollution Prevention and Control Plans (PPCPs) have been completed in six AOCs: Thunder Bay, St. Clair River, Detroit River, Hamilton Harbour, Metropolitan Toronto, and St. Lawrence River. The preparation of PPCPs are proposed for Severn Sound and Bay of Quinte in 1995. Two Areas of Concern (Hamilton Harbour, Metropolitan Toronto) already have projects that are either underway or completed to help meet this target.

COA Target: Demonstrate and implement new and innovative technologies directly contributing to the restoration of beneficial uses through green industry strategies and other programs of both governments.

Municipalities are being challenged to improve sewage treatment while exercising fiscal restraint. Several projects are proposed or are ongoing to apply new and innovative technologies to problems associated with discharges from sewage treatment plants and combined sewage overflows. These technologies are designed to improve water quality while reducing operating costs. Examples include:

- **Collingwood Harbour.** Here, an automatic control installed for phosphorus removal has been effective in meeting the RAP target.
- **Metro Toronto.** In this AOC, a new treatment device known as the “vortex separator” is being evaluated. The separator is designed to handle high instantaneous flows of stormwater and to remove heavy solids from the combined sewer overflows. Other particle separation devices such as microscreens, plate separators and filters for the removal of finer solids are being evaluated to determine if improved treatment levels can be achieved.

Innovative, low-cost methods to remove ammonia from plant effluent are being demonstrated at several sewage treatment plants (STPs). One process, known as on-off aeration, simply relies on turning on and off on a timed basis the air compressors that supply air to the biological

treatment system. This promotes the growth of nitrifying bacteria that utilize and break down the ammonia in the sewage without destroying other types of bacteria that are responsible for degrading the soluble organics in sewage.

Another method, known as Ringlace, uses many plastic ropes suspended from a frame that can be easily installed in existing STP tanks. The plastic ropes create a large surface area on which the nitrifying bacteria can grow facilitating the degradation of ammonia in the sewage.

SPECIES AND HABITAT REHABILITATION

COA Target: *Rehabilitate ecosystem function and structure of diverse self-sustaining native biological communities in 12 AOCs and other priority degraded areas.*

An interim report, "Guidelines for Collecting Baseline Aquatic Habitat Data in the Great Lakes Areas of Concern", was prepared early in 1995. The report initiated the standardization of data collection for the protection of aquatic habitat, and will assist in the selection, implementation and monitoring of remedial actions to address the degradation of populations and loss of aquatic habitat.

Inventories of aquatic habitat are underway at 10 AOCs: St. Clair River, Detroit River, St. Marys River, Hamilton Harbour, Bay of Quinte, Severn Sound, Thunder Bay, Spanish River, Nipigon Bay, and Metro Toronto.

For specific information regarding the sites, site selection and progress, see the COA target which addresses wetland and riparian habitat rehabilitation.

COA Target: *Develop and implement recovery plans for six threatened species.*

A "plain language" version of proposed federal legislation to protect endangered species was released for public comment in August 1995. A discussion document entitled "A National Approach to Endangered Species Conservation in Canada" was used as the basis for public consultation. Recovery initiatives in the Canada-Ontario Agreement clearly support the document's strategies, and the Great Lakes Action Plan is mentioned in the discussion document.

In the Great Lakes basin, action is underway on nine species: Henslow's Sparrow, Loggerhead Shrike, Bald Eagle, King Rail, Eastern Spiny Softshell Turtle, Atlantic Salmon in Lake Ontario, Eastern Massasauga Rattlesnake, Black Rat Snake, and the Peregrine Falcon. The approach taken with the Henslow's Sparrow includes ecosystem habitat protection in a grasslands recovery plan.

Through fisheries monitoring programs conducted in Lake Ontario, Ontario's Ministry of Natural Resources and U.S. agencies have found increased signs of natural reproduction of lake trout. Three years of classes are represented in the catch (1993, 1994, and 1995), which indicates that natural reproduction of this extirpated species has been successful over the last three years.

The Ontario Ministry of Natural Resources recently revised its Atlantic Salmon restoration plan for Lake Ontario. The emphasis in the short term will be on examining the factors which most likely limit successful re-establishment. Research will focus on habitat and competition impacts on juvenile Atlantic Salmon.

RECOVERY PLANS FOR THREATENED SPECIES



A recovery plan for coaster brook trout in Lake Superior is being developed along with a plan to fund the assessment component of this program through partnership agreements.

Work on Agreement targets has assisted in accelerating the accessibility of data for the Great Lakes basin through the Natural Heritage Information Centre.

The Natural Heritage Information Centre (NHIC) is a member of a collaborative data network that contributes to the hemispheric assessment of biodiversity. The NHIC compiles, maintains and disseminates information on vulnerable, threatened and endangered species and spaces in Ontario in support of ecologically-sound land use planning and biodiversity protection programs. The Centre is organized according to methodology developed by The Nature Conservancy (U.S.), and uses the Biological and Conservation Data System (BCD) to enter and manipulate this information.

COA Targets: Develop fish and wildlife community goals and objectives for each of the Great Lakes and implement plans to rehabilitate degraded native populations.

The development of goals and objectives for fish communities is in progress in Lake Ontario, Lake Erie and Lake Superior. Wildlife community goals and objectives will only be undertaken as part of a broader program Lakewide Management Plan (LaMP).

Steps have been taken to ensure that information presented at recent key events such as the State of the Lakes Ecosystem Conference and Habitat Conservation and Restoration Strategies (HabCARES) Workshop are available for general application.

For example, an Aquatic Habitat Rehabilitation and Conservation Technology Transfer Session was held in April 1995 to facilitate the transfer of information from the State of the Lakes Ecosystem Conference. The session focused on fish habitat management techniques. Major partners included the Great Lakes Fishery Commission, Department of Fisheries and Oceans, Ontario Ministry of Natural Resources, Environment Canada's Great Lakes 2000 Cleanup Fund and the IJC.

The HabCARES Workshop resulted in production of the manual "Methods of Modifying Habitat to Benefit the Great Lakes Ecosystem".

In addition, Environment Canada prepared a binder entitled "Rehabilitating Great Lakes Habitats - A Resource Manual", which describes techniques for enhancing biodiversity. This has been distributed widely in Canada and the U.S. and will be updated periodically.

COA Target: Increase the extent of productive aquatic habitats by rehabilitating and protecting 6000 hectares of wetland habitat and 600 kilometres of riparian habitats.

There are 54 habitat-related projects underway which are associated with the Agreement. Of this number, 37 projects are located in 11 AOCs and three projects are in priority non-AOC sites. Rehabilitation techniques are being developed and applied and the habitat secured and monitored. Many of these initiatives are well underway; in some, monitoring is all that is required. The remaining 14 projects support and facilitate rehabilitation activities generally in the basin.

In addition:

- Criteria for selection of priority sites for wetland rehabilitation were developed and a workshop held to begin site selection.
- Rehabilitation projects for 2265 hectares of wetlands are underway.
- Projects for 140 km of riparian habitat are also underway.
- The Great Lakes 2000 Cleanup Fund published the report "Fish and Wildlife Habitat Rehabilitation Program – Project Highlights" in January, 1995.

CONTAMINATED SITES

COA Target: Remediate contamination at ten priority federally-owned sites, at five orphan sites under the National Contaminated Sites Remediation Program, and an expected 20 sites under provincial jurisdiction.

Under the National Contaminated Sites Remediation Program, site remediation progressed during the year as planned at the five "orphan" sites (contaminated sites where the owner cannot, or will not, pay for the cleanup, or where the owner cannot be located):

- Tyre King Fire Site, Townsend Township, Hagersville,
- Chemical Waste Management Ltd. PCB Spill Site, Smithville,
- National Hard Chrome Site, North York,
- Shamrock Chemicals, Port Stanley, and
- Deloro Mine Site, Deloro.

The Shamrock Chemicals site at Port Stanley was, at one time, an oil gasification site and later a fertilizer production factory. The soil, surface water and groundwater have been contaminated by oil tar and a variety of chemicals associated with fertilizer production. The oil tar has migrated to the adjacent Kettle Creek, and local groundwater has been contaminated by polycyclic aromatic hydrocarbons (PAHs) and other organic chemicals. Local groundwater is not used for domestic supplies and serves only as a mechanism for contaminant transport to Kettle Creek. Remedial work has been completed to drain and dismantle on-site vessels containing liquid chemicals and to contain off-site migration of contaminants leaking from one of these vessels. All surface sources of contamination have been removed and the soil and groundwater cleaned up to eliminate contaminant discharges into Kettle Creek. All contaminated soil on the Shamrock Chemical portion of the property has been excavated. Only the on-site treatment of the soil remains to complete the cleanup at this site, and this treatment will be undertaken in 1995. Bioremediation of contaminated soil continues on the Ultramar portion of the site.

Site remediation at these five sites to date has been co-funded by the Ministry of Environment and Energy and Environment Canada. The orphan site program, however, ended on March 31, 1995 and

funding from Environment Canada is no longer available for Smithville, Hagersville, Deloro, and National Hard Chrome. Further remediation work at these sites will be borne solely by the Ministry of Environment and Energy. 50 per cent funding will be provided by Environment Canada for the Port Stanley site until March 31, 1996.

Nine contaminated sites under Provincial jurisdiction have been identified for remediation. Remediation activities include cleanup of PCB wastes and contaminated soil, and cleanup and removal of illegally buried wastes.

Five of the 20 contaminated sites under Provincial jurisdiction have been remediated to date.

Seven sites have or will use provincial funds from the Ministry of Environment and Energy for cleanup. Two site cleanups will be paid for by the responsible parties. Of the nine sites, five have been remediated to date, and work is planned for, or continues at, the other four sites, with completion scheduled by 1997. The completed sites are located in the City of Niagara Falls, City of Windsor, Paris Township, Moore Township and Paipoonge Township. Other sites will be added to this list for cleanup as the situations arise.

COA Target: Assess and prioritize closed landfill sites under provincial jurisdiction for potential problems.

Ontario's Closed Waste Sites Program involves the prioritization and assessment of closed waste disposal sites in the province to determine the potential impact on human health and the environment.

To date, over three hundred sites have been prioritized for assessment under this program during the next five years. Prioritization is based on: (1) the type of waste received at the site, (2) the age of the site, (3) the setting (distance to potential receptors), and (4) previous assessments. Assessment consists of a review of available information on the site and a visual inspection carried out by Ontario Ministry of Environment and Energy hydrogeologists.

As of May 1995, thirteen sites have been assessed. Nine of the thirteen sites show no obvious impacts or potential impacts and, therefore, require no further assessment under this program at this time. Three sites are under consideration for further assessment, and one site requires a visual inspection to confirm that there is no apparent problem at this time.

The program is ongoing and additional high-priority sites will be assessed during the current summer and fall months of 1995.

CONTAMINATED SEDIMENTS

COA Target: Describe effects, demonstrate and implement the clean up of severely contaminated sediments, with emphasis on contamination at priority sites in AOCs.

Contaminants in sediment at the nearshore of the Great Lakes frequently exceed the Ontario Ministry of Environment and Energy sediment management guidelines. The guidelines are used to determine how clean, or how polluted, sediment may be. Where concentrations of contaminants in Great Lakes sediment exceed the guidelines, biological tests are undertaken to indicate the extent to which the material is considered severely contaminated. Eight locations in Areas of Concern are of this nature.

Traditional methods used to remove sediment for navigational dredging may not be appropriate for dealing with severely contaminated sites. New technologies are being developed, demonstrated and used under Environment Canada's Great Lakes 2000 Cleanup Fund, which involves provincial, municipal, and private sector partners.

To determine the most appropriate cleanup strategy, detailed site assessment must be conducted to measure:

- Volume of contaminated sediment,
- Physical and chemical composition of the sediment,
- Response of biota to the sediment, and
- Control of sources of pollution.

The effects of contaminants on biota and the spatial extent of contaminations have been established for:

- The Northern Wood preservers site in Thunder Bay,
- The Algoma Slip and Algoma River in the St. Marys River,
- The Welland River at Atlas Steel in the Niagara River,
- Adjacent to Randle Reef in Hamilton Harbour,
- The St. Lawrence River at Courtaulds, and
- The Turning Basin in Port Hope Harbour.

Projects to demonstrate the performance of innovative removal technologies were implemented in Hamilton Harbour, Niagara River, and St. Marys River in 1994. Further demonstration projects and potential full-scale cleanup initiatives are under discussion.

Treatment options to reduce the volume of contaminated material or render the material safe for alternate uses have been explored at the St. Marys River, Hamilton Harbour, and Niagara River sites.

COA Target: Develop long-term strategies for remediation of areas of intermediate sediment contamination at 10 locations by the year 2000.

Long-term strategies for sediment remediation always reflect the need to control sources of pollution. In many situations this will allow for natural recovery to occur. If a sediment cleanup program is implemented at a site where pollutants continue to enter the environment, recontamination is likely to occur. Reducing or eliminating the input of contaminants, then, is the first step in the design of a comprehensive plan.

Sources have been controlled in Nipigon Bay, Jackfish Bay, Peninsula Harbour, Severn Sound, Collingwood Harbour, Wheatley Harbour, and the Bay of Quinte.

Enhancing the rate of sediment recovery, once the pollution source is abated by treating the sediment in place with compounds that accelerate the degradation of organic contaminants, or alleviate metal toxicity, is also a consideration. These technologies are largely experimental and are valuable in cases where contamination is not severe. Small-scale treatment experiments have been completed in the St. Marys River, Hamilton Harbour and Niagara River in order to compile the comprehensive long term strategy.

Successful programs for the restoration of sediment quality have been implemented in Nipigon Bay, Severn Sound, and Collingwood Harbour.

Presently, plans have been defined for 19 locations, including all the AOCs. The total volume of sediment for which long term remedial strategies have been identified is approximately 500,000 cubic metres.

Successful programs for which no further action is required to restore sediment quality were undertaken at Nipigon Bay, Severn Sound and Collingwood Harbour. With sources controlled, natural processes will restore sediment quality in Nipigon Bay. In Collingwood Harbour and Severn Sound, sources of pollution are no longer active and full-scale removal of the sediment that impaired environmental quality has been completed. As a result, these ecosystems will continue to improve.

GROUNDWATER

COA Target: *Undertake hydrogeological investigations and demonstration of new approaches to remediate groundwater contamination at priority locations.*

Hydrogeologic investigations and demonstrations of new approaches to remediate groundwater have been initiated at six sites in the Great Lakes Basin Ecosystem.

- A large indoor sand tank, 6m x 2m x 2m, was completed in 1994 at the Canada Centre for Inland Waters (CCIW) in Burlington. The tank is designed to do large-scale tests of techniques to remediate contaminated groundwater.

- Geochemical techniques, involving vitamin B-12 to dechlorinate residual contaminants in ground water, were developed and tested in the laboratory at CCIW in 1994. Field tests of the vitamin B-12 technique are scheduled to be completed in 1995 at Canada Forces Base Borden, near Alliston.
- Techniques involving humic acids to remediate residual groundwater contamination are being tested in the laboratory at CCIW in 1995 and are scheduled for development by 1996.
- At Point Pelee National Park, hydrogeological investigation of groundwater pollution caused by septic systems was completed in 1994. Field remediation techniques involving the placement of "cassettes" of wood chips into the contaminant plume are being carried out in 1995. Results are expected in 1996.
- In 1994 in the Niagara Region, geophysical and chemical methods were developed for use in shallow aquifers to distinguish natural-source hydrocarbons from hydrocarbon contamination caused by human activity.
- Regional groundwater flow models are currently being developed to investigate the linkage between groundwater and surface water at sites in Lambton, Essex and Kent Counties in southwestern Ontario.

HUMAN HEALTH

COA Target: *By 2000, reduce the risk of exposure to specific environmental contaminants in six known high-risk populations by 50 per cent.*

Under Health Canada's Great Lakes 2000 program, four specific activities have been identified to meet this COA target: completion of community risk/exposure assessments in the 17 Areas of Concern; implementation of exposure reduction strategies in 12 Areas of Concern; determination of health consequences of remedial activities in 17 Areas of Concern; and completion of six research studies on susceptible populations.

Two handbooks have been developed to assist communities within the Great Lakes basin to conduct self-directed exposure assessments to contaminants. Four workshops were held in July 1994 with RAP Coordinators and PAC members at Thunder Bay, Sarnia (St. Clair River), Metro Toronto and Kingston (Bay of Quinte), to assess the usability of the handbooks by individuals in the community. The handbooks are currently being revised based on comments received at the workshops.

A 400-page handbook to be used by health professionals, public health units, and community health centres was developed and is undergoing review prior to finalization. This handbook will be distributed to health professionals within the 17 Areas of Concern and other degraded areas and will be used to provide information to Great Lakes basin residents to reduce risk from exposure to contaminants.

Partnerships have been established with the women's health and environment networks and with child health and immigrant groups. Through public education and information sharing, high-risk populations are receiving support to change personal and community behaviour to improve health.

Five toxicological research studies and one epidemiological study have been initiated. The studies are designed to address emerging concerns about endometriosis, neurobehavioural effects on the young, and breast cancer in the Great Lakes basin. For example, the endometriosis study seeks to clarify the role that dioxins may play in causing this disease in women. The neurobehavioural study is being undertaken to help clarify the risk of possible neurobehavioural changes in infants born to mothers consuming contaminated Great Lakes fish. Partnership research projects on breast cancer are underway and are supplemented with a workshop to evaluate new findings. Information obtained from these studies will be used in a public education campaign, and for the development of risk reduction strategies.

Preliminary studies have been completed to identify high-risk groups in the Toronto, Hamilton and Niagara areas. The high-risk groups identified include anglers, pregnant women, and certain groups of immigrants. A strategy has been developed and implemented to make these groups aware of the health implications of exposure to contaminants, and the best ways to reduce their personal risk. Further studies to identify high-risk groups in other Areas of Concern will be undertaken as the program progresses.

OBJECTIVE 2 PREVENT AND CONTROL POLLUTION

The targets set out under Objective 2 of the 1994 COA related to prevention and control of pollution are among the most challenging and pressing in the Agreement.

The proposed approach calls for a systematic and strategic focus on the sources of targeted substances. The intent is to develop and implement appropriate action plans for the reduction and elimination of those substances from each source where existing activities are insufficient. A number of tools are being applied, ranging from regulation to voluntary programs such as pollution prevention initiatives.

The identification of sources, the estimation of baseline releases and loadings, and up-to-date information on the results, by source, of voluntary activities are essential steps to successful action and to measuring and reporting progress. Federal and Ontario officials have put much effort in this first year of COA in addressing these important first challenges.

Current information on sources and loadings is limited in several areas, highlighting the need to strengthen monitoring and inventory programs. The multiplicity of sources of the chemicals of concern in the basin can then be identified, and attention focused on priorities. For example, particular attention must be given to air emissions, as the atmosphere is now an increasingly significant pathway for loadings of these pollutants into the basin.

In the meantime, federal and Ontario agencies will continue to work with known and emerging sources to achieve COA targets, and to measure progress based on preliminary estimates of releases and loadings.

PRIORITY TOXIC SUBSTANCES

COA Target: *For Tier I substances –*

Confirm by 1996 that zero discharge has been achieved for five priority substances.

The five substances referenced under this target are the pesticides aldrin/dieldrin, chlordane, DDT, toxaphene and mirex.

When the 1994 COA was signed, federal registration of pesticides which contain the active ingredients aldrin/dieldrin, chlordane and DDT had already been discontinued, and the registration of toxaphene had been suspended in Canada. Mirex was never registered in Canada for agricultural use. Its import, manufacture, processing, sale and use for other purposes is now prohibited under the Canadian Environmental Protection Act.

Further, Ontario regulation 162/94 prohibits the use, handling, storage, sale, transport, and disposal of all five pesticides, complementing federal regulations.

As a first step to confirming that zero discharge (i.e., no use, generation or release) of these substances had been achieved, provincial licensing records, historical trend data, compliance inspection records, and Statistics Canada records are being examined in order to locate possible existing stocks.

In a 1993 survey of registrants of pesticide products, MOEE established that the only private stock of aldrin/dieldrin in Ontario (and Canada) was held by one company. MOEE was able to determine that this company was the sole user because of the restricted (by permit only) use of the products and limited number of licensed exterminators. In 1993, this company disposed of the last known stocks in Ontario (227 L aldrin and 23 L dieldrin) to a secure landfill site.

The Ministry of Agriculture, Food and Rural Affairs conducts a Pesticide Use Survey in the agricultural community every five years. The Ministry is determining if the survey can be revised to list the banned pesticides, and whether another Pesticide Collection Program can be conducted.

Approximately 180 municipalities representing about 70 per cent of citizens in the Great Lakes basin have held at least one household hazardous waste day. Some municipalities have regular collections or permanent stations. Residents are encouraged to take advantage of household waste collection days to get rid of old pesticides and contribute to elimination of these materials from the basin.

Investigations are under way to determine the quantities of banned pesticides which have been collected by the municipalities. Pesticides are collected on municipal household hazardous waste days. Because only one waste category is assigned to pesticides, types and specific pesticides are not itemized. For example, chlordane had limited use by homeowners, some of whom may still have small quantities in their possession.

COA Target: Seek to decommission 90 per cent of high-level PCBs in Ontario, to destroy 50 per cent of the high-level PCBs now in storage, and accelerate the destruction of stored low-level PCB waste by the year 2000.

Agreement on a process to track PCB decommissioning and destruction was reached by a joint committee comprised of the major owners of PCBs (corporations, utilities and industrial associations) in Ontario. Baseline inventories of PCBs were calculated as shown in the table below.

HIGH-LEVEL PCB MATERIAL IN ONTARIO

PCBs in Ontario	Liquid (tonnes)	Waste (tonnes)
In Service	6,900	0
In Storage	3,600	18,600
Baseline Quantities	10,500	18,600 ¹
Destroyed	0	241

¹ Includes the 3,600 tonnes of liquid PCB in storage.

The high-level destruction target will apply to the 18,600 tonnes of high-level PCB wastes now in storage in Ontario. The high-level decommissioning target will apply to the 10,500 tonnes of liquid PCB waste in Ontario.

COA, with the cooperation of PCB owners across Ontario, requires that quantities decommissioned and destroyed must be updated annually to determine progress towards the COA commitment. The cooperation of the members of the Ontario PCB owners' group, including input to this report, has been excellent, and has served to facilitate progress towards the PCB targets.

DECOMMISSIONING OF HIGH-LEVEL PCBs

As of the end of 1994, more than 35 per cent of Ontario's high-level PCBs along with the associated wastes (transformer carcasses, soils, etc.) have been decommissioned and placed into storage.

DESTRUCTION OF HIGH-LEVEL PCBs

In Ontario, a small amount of high-level PCB waste (240 tonnes) was destroyed at Smithville as part of a discrete site cleanup. More recently, a number of destruction options have begun to emerge for owners and Ontario Hydro was the first to successfully destroy PCB wastes in Ontario since Smithville.

APPROVED METHODS

The government of Alberta has agreed to accept PCB waste from other Canadian provinces at the Bovar Swan Hills facility. Meetings with waste management companies, transporters and brokers to discuss approvals for the shipping of Ontario's waste to Alberta have taken place, and several waste haulers are now licensed to transport PCBs to Alberta. No fixed PCB destruction facility owned or operated by the government will be located in Ontario, given the outcome of the hearings on the proposed Ontario Waste Management Corporation facility. Instead, privately-operated mobile or regional temporary facilities will be utilized in Ontario.

Ontario Hydro successfully destroyed 1000 kg (one tonne) of pure PCBs in June/July of 1995 using their approved mobile chemical destruction process. This new technology is an adaptation of the sodium destruction process successfully applied to low-level PCBs for several years, and modified to successfully treat high-level PCBs.

General Motors of Canada Limited will be conducting a demonstration project for the destruction of PCB wastes at GM's Glendale Avenue facility in St. Catharines, using Eco Logic's mobile facility. This demonstration project, scheduled to take place this fall, will treat a wide variety of wastes including approximately 1000 drums containing obsolete electrical equipment, contaminated liquids and materials, as well as contaminated soils and concrete.

Dofasco Inc. has contracted with Eco Logic to process approximately 280 tonnes of PCB askarel and electrical transformers at the Sherman Mine in Northern Ontario.

LOW-LEVEL PCB DESTRUCTION

As of 1994, a total of 17,000 metric tonnes of low-level PCB liquids have been treated. To a large degree, this has been made possible through owners who voluntarily initiated transformer retrofit programs, making the oils available for treatment. Much of this oil was collected from many small sources and transported to consolidation sites prior to decontamination. Consolidation facilitates the cost-effective treatment of widely distributed, relatively small PCB inventories.

In addition to low-level liquids, there are also at present, 98,000 tonnes of low-level PCB wastes in storage, including 90,000 tonnes of contaminated soil.

Remaining challenges include:

- determining whether consolidation of PCB stores may facilitate their economical and efficient treatment and destruction;
- recognizing that no fixed PCB destruction facility will be located in Ontario, develop strategies to address local community resistance to the siting of mobile treatment and destruction facilities; and
- recognizing that full cost estimates for decommissioning and destruction, already estimated at \$1 billion, do not cover uses such as equipment decontamination.

COA Target: Seek a 90 per cent reduction in the use, generation or release of the remaining seven substances by the year 2000.

The seven targeted substances are benzo(a)pyrene, hexachlorobenzene, alkyl-lead, mercury, octachlorostyrene, PCDD (dioxins) and PCDF (furans).

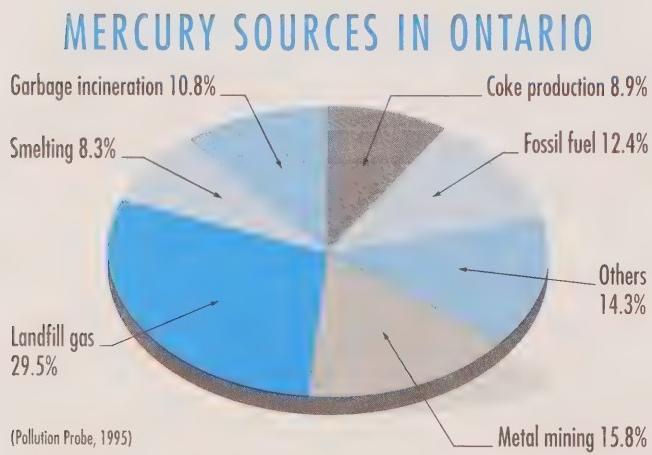
A preliminary review of existing data has been undertaken for most source categories, including industrial, commercial, diffuse, mobile and natural categories. Information was unavailable for many source categories. Work continues to refine and complete baseline data.

Based on preliminary data, however, total annual releases in Ontario of the following Tier 1 pollutants can be estimated. Actual amounts reaching the waters of the Great Lakes remain uncertain. Estimated annual releases total approximately 23,230 kg:

- 1060 kg per year of alkyl-lead
- 18,660 kg per year of benzo(a)pyrene
- 64 kg per year of hexachlorobenzene
- 3,450 kg per year of mercury
- 4 grams per year of octachlorostyrene
- 60 grams per year of 2,3,7,8-tetrachlorodibenz-p-dioxin
- 1.251 kg per year of 2,3,7,8-tetrachlorodibenzo-furan

The data also suggest that more than 90 per cent of these seven Tier I substances are released to the atmosphere, mainly from point or non-point combustion sources. Approximately half of the releases are from diffuse, non-industrial or mobile sources. Benzo(a)pyrene, mercury and alkyl-lead contribute 80 per cent, 14 per cent and four per cent respectively, to the total release of these Tier I substances. Alkyl-lead releases are primarily from combustion of aviation fuel. The use and disposal of commercial products may be significant sources of benzo(a)pyrene (creosote use) and of mercury (products containing mercury disposed of in landfills).

A good example of a partnership venture to help implement pollution reduction for a Tier I pollutant is the partnership between Pollution Probe, industry and governments to promote and demonstrate reductions in mercury use, generation or release. Pollution Probe researchers have confirmed the mercury use and release tree generated by the Lake Superior Binational Program, and developed estimates of mercury release in Ontario. Discussions with the health (dentists, hospitals, pharmaceuticals), manufacturing and electronics sectors are underway to seek out partnerships.



Pollution Probe's work also suggests that landfill gases may be a significant contributor to the total mercury emissions in the basin. Released from rotting garbage, these gases (methane) contaminated by mercury leaching from products left over from past landfill uses, such as batteries and fluorescent tubes, thermometers, and switches. They may contribute as much as 37 per cent of all mercury emissions in Ontario to the atmosphere or 29 per cent of total mercury releases.

Much has been done in the past several years to reduce mercury use, generation or release. Particularly striking are the reductions of mercury levels in paint (90 per cent), mercury use in fluorescent tubes (50 per cent), and the movement towards mercury-free batteries (92 per cent).

COA Targets: For Tier II substances and other pollutants –

Collaborate with, and provide support for, voluntary programs by industry and others to reduce the use, release or generation of Tier II substances, and establish specific timelines and targets for achieving their virtual elimination.

Tier II substances include anthracene, cadmium, 1,4-dichlorobenzene, 3,3-dichlorobenzidine, dinitropyrene, 4,4-methylenebis (2-chloroaniline), pentachlorophenol, tributyl tin, and PAHs as a group.

Analysis of release and loading data for these substances indicates potential sources and loading pathways. Information on many of these compounds is limited and further work is under way to improve individual pollutant profiles.

Both natural and anthropogenic sources of Tier II substances were found to contribute to pollution in the Great Lakes basin. Major sources include forest fires, combustion and incineration processes from industrial and municipal operations, domestic activities, transportation sector activities, and various manufacturing processes (e.g., metal casting, paint, plastics, rubber, textiles and wood products manufacturing).

COA Target: Provide essential knowledge on the fate and effects of Tier II substances from industrial, municipal and other sources.

A variety of research efforts are under way to update information on the occurrence, fate and effects of Tier II substances, as well as to consider other substances which may be added to the Tier II list. An environmental information/modelling system is being developed at the National Water Research Institute of Environment Canada, to compile large amounts of data and to provide a visual, expert-based representation of the fate of the released pollutants. In the past, this expertise was used to provide valuable information on the relative sources and impacts of SO₂ and NO_X emissions from a variety of sources.

A study was initiated on the occurrence and effects of organotin, including tributyl tin, in the aquatic environment. This also involved a national survey of organotin in water and sediment from 100 locations, and in the influents and effluents from 15 sewage treatment plants (STPs) across Canada. Several locations in the Great Lakes were included.

To address agricultural nonpoint sources, a study was completed that explored the occurrence, fate and effects of metolachlor, one of the most heavily used herbicides in Ontario. Results show that metolachlor is fairly persistent in lake waters and that its extensive use may have long-term effects on the aquatic ecosystem. Dissipation and loss of atrazine and metolachlor studies in agricultural soils helped validate pesticide transport models.

A study was initiated on the occurrence of nonylphenol, a potential hormone disruptor, in several harbours and rivers draining into the Great Lakes, in sewage treatment plant influents and effluents, and in pulp mill effluents. Nonylphenol (NP) is a persistent, lipophilic and toxic metabolite of nonylphenol ethoxylates (NPE), a major class of non-ionic surfactant used across Canada, and a suspected endocrine disruptor. Very little data exist on its occurrence in the Canadian environment. A preliminary report on the occurrence is expected by March, 1996.

Under current examination are the migration pathways of PAHs in urban environments, and the cost-effectiveness of urban runoff control strategies that are being used to mitigate the inputs of PAHs into receiving water bodies. The Sault Ste. Marie case study application demonstrated that snow removal and relatively small wet and/or dry stormwater management ponds are the most cost-effective strategies for remediation. Research results will assist in mitigating loadings of PAHs from urban nonpoint sources into the Great Lakes.

To help assess the implications of persistent toxic substances on human health, Health Canada has established a multimedia database with information on contaminant levels in fish and drinking water from the Great Lakes basin. Data is derived from ongoing human breast milk and placental tissue sampling programs. Contaminant levels in air, food, soil and sediment are being collected to extend this database.

COA Targets: For Tier I, Tier II and other polluting substances –

Work with industry to attain commitments to achieve the targets stated herein through such formal arrangements as Memoranda of Understanding, and through informal arrangements as appropriate.

Implementation by 1998 of pollution prevention programs will be promoted and encouraged at targeted industrial facilities discharging to the Great Lakes, through a variety of instruments, including the Ontario Pollution Prevention Pledge Program for Ontario and the national Accelerated Reduction/Elimination of Toxics (ARET) initiative.

In recognition of the need for partnerships to deliver and report on Objective 2 targets, a Corporate Working Group has been established to encourage participation from industry, manufacturing, municipalities and other sectors that are sources of pollutants. To date, activity has been concentrated on industry and their various associations, building predominantly upon the partnerships struck within the national Accelerated Reduction/Elimination of Toxics initiative (ARET) and the Ontario Pollution Prevention Pledge Program (P4).

Participants include the Canadian Chemical Producers' Association, DOW Canada, Ciba-Geigy, the Canadian Petroleum Products Institute, the Lambton Industrial Society, the Ontario Mining Association, Geon Canada, Ontario Hydro, the Motor Vehicle Manufacturers Association and the Auto Parts Manufacturers Association.

Additional sources of Tier I and Tier II pollutants have been identified through the development of emissions and release inventories. These sources will be asked to participate in the Corporate Working Group in order to facilitate pollutant measurement and to ensure all significant sources of these pollutants make progress in reducing pollutant levels.

A number of voluntary partnerships have been established with industrial and commercial associations, communities, municipalities, and member companies which report on reductions in pollutant use, generation or release. In addition, Memoranda of Understanding (MOUs) have been signed between the federal and provincial governments and the following:

- Motor Vehicle Manufacturing Association, and Chrysler, Ford and General Motors,
- Canadian Association of Metal Finishers, American Electroplaters and Surface Finishers Society, Metal Finishers Suppliers Association and four participating member companies,
- Automotive Parts Manufacturers Association and six participating member companies,

- Five member companies of the Canadian Chemical Producers Association,
- Member companies of the Ontario Printing Industry Association and the Printing Equipment Supply Dealers Association, and
- Regional Municipality of Hamilton-Wentworth.

Other partnerships exist within the following sectors: industrial laundries, photo processing minilabs, the food processing sector and the Restaurant Association, the Green Clean (Wet Cleaning) Demonstration Project and the Emery Creek Environmental Association.

Some of the pollutant reductions that are being reported throughout ARET, P4 and MOUs are shown below.

Reductions in all Tier I and Tier II substances and other conventional pollutants through P4 for the 139 assessed facilities (to end March 1995) totalled 18,000 tonnes.

Specific reductions:

- 4300 tonnes hydrocarbon emissions
- 370 tonnes heavy metal-related wastes
- 7 tonnes ozone-depleting substances
- 190 tonnes PCBs
- 800 tonnes VOCs and solvents
- 12,200 tonnes other reductions

Reductions through MOUs for the 72 participating companies or communities totalled 3960 tonnes.

Specific reductions:

- 925 tonnes landfill solids
- 15 tonnes hazardous solid waste
- 13 tonnes hazardous liquid waste
- 660 tonnes sewage treatment plant sludge
- 226 tonnes organic liquids
- 1585 tonnes volatile solvents
- 21 tonnes metals
- 64 tonnes PCBs
- 21 tonnes inorganic salts

More than 100 industrial facilities and government agencies in Ontario responded to the ARET challenge to reduce or eliminate emissions of toxic substances. Reported reductions of COA Tier I and Tier II substances include:

ARET ONTARIO REDUCTIONS OF COA SUBSTANCES

COA Substance	Units	Annual Emissions		Reduction
		Base year ¹	1993	
Tier I				
Hexachlorobenzene	kilograms	2.1	0.4	81%
Alkyl-lead	—	nd	nd	—
Mercury (elemental and inorganic)	kilograms	123.6	117.6	5%
Octachlorostyrene	kilograms	0.7	0.00	100%
2,3,7,8-tetrachlorodibenzo-p-dioxin	grams	107.4	1.1	99%
2,3,7,8-tetrachlorodibenzofuran	grams	365.6	6.4	98%
Tier II				
Anthracene	tonnes	2.850	2.189	23%
Cadmium (and its compounds)	tonnes	4.958	4.644	6%
1,4 dichlorobenzene	tonnes	0.570	0.364	36%
3,3'-dichlorobenzidine	—	nd	nd	—
Dinitopyrene	—	nd	nd	—
Hexachlorocyclohexane	—	nd	nd	—
4,4'-methylenebis(2-chloroaniline)	—	nd	nd	—
Pentachlorophenol	kilograms	7.7	4.0	48%
Tributyl tin	—	nd	nd	—
PAHs (as a group) ²	tonnes	133.732	124.990	7%

nd none declared

¹ choice of base year from 1988 to 1993 made by individual ARET participant

² includes Tier I substance benzo(a)pyrene

The identification of sources which are not participants in ARET is ongoing. Each new source will be asked to voluntarily adopt ARET/COA goals because of the tremendous potential for cost-effective reductions.

HAZARDOUS WASTE AND SPILLS

COA Target: *Significant, measurable reductions in the generation and release of hazardous wastes from all sources will be the focus of cooperative activities with waste generators.*

Both levels of government are seeking to enhance reductions in the generation and release of hazardous waste by building on the pollution prevention efforts already under way. Some of the reductions are reported through P4, MOUs and ARET.

The existing hazardous waste import/export information database (i.e., the Canadian Environmental Protection Act database management system) has been upgraded to an electronic tracking system.

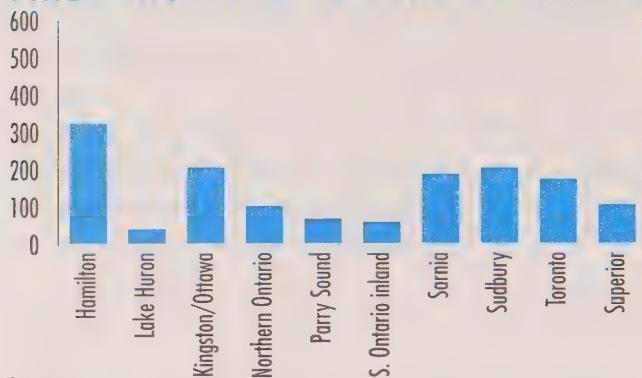
Ontario's existing activities for hazardous waste management include a regulatory framework within which waste generators and the private sector waste management industry can operate. Activities also include monitoring and enforcing regulatory provisions; encouraging and facilitating pollution prevention, the 3Rs, and product stewardship; promotion of environmentally sound treatment and disposal technologies; and partnerships with other governments, industry and environmental NGOs.

The following regulatory items are already in place: a regulation that defines hazardous waste; mandatory generator registration; a manifest system to track cradle-to-grave movement of waste; and, a regulation that specifies liability. Pollution prevention, 3Rs and their innovative technologies and systems, and product stewardship initiatives were funded through the Industrial Waste Diversion Program (IWDP).

COA Target: *The prevention and control of spills, by improving federal, provincial and industrial spill prevention, preparedness and response programs in priority areas such as the St. Clair River, will further reduce pollutant loadings.*

Spill data (federal and provincial) were reviewed to determine the optimal locations for spill prevention workshops. Four are tentatively scheduled for Sarnia, Cornwall, Sault Ste. Marie, and Hamilton/Toronto. U.S. and Canadian agencies agreed that Marine and Inland Plans should be supported by a single Annex. A test of a Regional Environmental Emergency Team (REET) for a Petro Canada spill exercise was conducted and a report prepared.

SPILLS IN ONTARIO FROM FIXED FACILITIES IN 1994 BY REGION



Footnotes:

- 1 Figure represents all reported spills. Most spills occur on land, involve small quantities of materials, and do not impact waterways.
- 2 Some regions shown contain areas lying outside the Great Lakes drainage basin.
- 3 There were 5007 spills reported in 1994, including those from fixed facilities.

Atlases identifying areas (marshes, bird breeding areas) particularly sensitive to oil spills have been completed for Lake Huron, Lake Superior and Lake Ontario.

PESTICIDES

COA Target: *A coordinated review and evaluation of registered and scheduled pesticides will be conducted.*

A Pesticides Review Committee, consisting of representatives from six federal/provincial agencies, has been formed to lead the review. Proposed pesticides for review and risk reduction are:

- Mercury-based fungicides
- Dicofol
- Carbofuran
- Tributyltin pesticides
- Lindane
- Amitrole

Three other pesticides (endosulfan, dinitroanilines as a group including trifluralin, diazinon) are proposed for assessment and longer-term action.

Stakeholders are being canvassed for their views on the proposed initiative and their interest in participating in the process.

BINATIONAL INITIATIVES

COA Target: *Reduction targets will be pursued under the Niagara River Toxics Management Plan and Lakewide Management Plans.*

The Niagara River Toxics Management Plan has reported progress in reducing loadings of 18 toxic substances from U.S. and Canadian sources along the river. Nine of these substances include:

- six Tier I contaminants (PCBs, mirex, dioxins, mercury, benzo(a)pyrene, hexachlorobenzene), and
- three Tier II contaminants (benz(a)anthracene, benzo(a)flouranthene, benzo(k)fluoranthene).

These substances are targeted for a 50 per cent reduction from 1986 levels. Since 1986, Ontario sources have surpassed that target and reduced the discharge of these substances by 95 per cent.

COA Target: *Toxic reduction plans for major industrial sectors will be incorporated into Lakewide Management Plans for Lakes Ontario and Superior by 2000.*

Canada and Ontario have completed a beneficial use assessment and have identified a number of pollutants which impair these uses for Lake Ontario. They are now seeking consensus with U.S. agencies on binational critical pollutants. Toxics reduction plans for these pollutants can then be developed to reflect binational goals in the Lake Ontario Lakewide Management Plan.

A LaMP (Stage 1: Problem Definition) for Lake Superior has been completed and will be conveyed by governments to the International Joint Commission at their fall 1995 meeting. Load reduction targets (Stage 2) will also be identified by the fall of 1995. These targets will consider load reductions for mercury, PCBs, and a variety of pesticides which were recommended by the Lake Superior Binational Forum, a multi-stakeholder public group advising governments.

COA Target: The role of zero discharge in achieving the virtual elimination of persistent, bioaccumulative and toxic substances will be demonstrated, bearing in mind social and economic factors, primarily through the Lake Superior Binational Program.

The Lake Superior Binational Program, which includes LaMP development and pollution prevention initiatives, is undertaking source analyses and economic assessments to demonstrate the effects of zero discharge (water) and zero emission (atmospheric) for nine designated critical pollutants, all of which are Tier I substances. Sector-specific targets will be discussed with stakeholders in 1996.

COA Targets: Jointly declare the waters of Lakes Superior and Nipigon under a designation such as the Canada Water Act Part I, and investigate this mechanism for other exceptional waters.

COA partners are discussing options for special designation status for Lake Superior. Additional information on Lake Superior can be found under Objective 3 and its goal to secure a network of protected areas in the Great Lakes basin.

COA Target: Establish with U.S. Federal and State governments, a common strategy by 1996 to eliminate the discharge of persistent, bioaccumulative and toxic substances to the entire Great Lakes Basin Ecosystem.

Canadian and U.S. officials have reached agreement on a draft binational strategy. The draft strategy targets all COA Tier I and many COA Tier II substances and includes several substances from the U.S. EPA's bioaccumulative chemicals of concern list. As such, the strategy sets the stage for more coordinated binational activities related to reduction and elimination of these substances, consistent with the respective Canada and U.S. domestic programs. The strategy will also facilitate the development of a basin-wide database to support progress measurement.

Canadian and U.S. stakeholders are jointly reviewing the draft strategy.

ATMOSPHERIC DEPOSITION

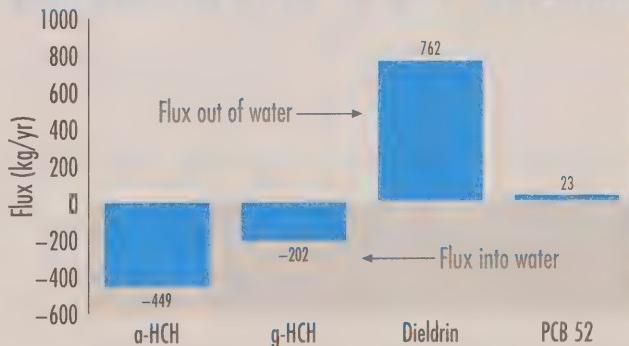
COA Target: The identification of atmospheric inputs of toxic chemicals, and their impacts, derived from worldwide sources, will provide a basis for supporting international negotiations to reduce loadings in the Great Lakes Basin Ecosystem.

Research and monitoring efforts relating to atmospheric inputs and impacts are ongoing. Canadian and U.S. efforts in the basin are coordinated through the Integrated Atmospheric Deposition Network, which was developed under the Great Lakes Water Quality Agreement.

Data on the atmospheric loadings to the Great Lakes of 11 organochlorine chemicals, five trace elements and four PAHs were updated to 1994. Improved estimates of inputs, including seasonal variability, have been compared to previous (1988-1992) estimates. Nine of the organochlorines (four PCB cogeners, dieldrin, HCB, DDE, DDT and DDD) are currently showing a net loss from the lakes to the atmosphere via volatilization, with two (*a* and *g*-HCH) near equilibrium.

Using data primarily from the IADN network, the results provide a detailed data set for the interpretation of atmospheric impact on the lakes. Following is a chart of the overall flux for several organochlorines in Lake Superior.

OVERALL FLUX FOR SEVERAL ORGANOCHLORINES IN LAKE SUPERIOR



Three studies are being conducted by Health Canada to more specifically define human exposure to air pollutants in the Great Lakes basin. The first study is looking at specific activities being carried out by individuals and their exposure to air pollutants at particular times during the day. The second study is using computer models to estimate airborne exposure across the basin to link up with health outcomes such as hospital visits, while the third study is looking at the costs related to health problems caused by ground level ozone and airborne particles.

Canada was instrumental in convening the June 1995 meeting of international experts in Vancouver to explore the problem and promote global action on persistent organic pollutants. Canada brought forward the concerns of the Great Lakes basin through a case study on the loadings to the basin of persistent toxic substances through long-range air transport. Of the eight substances profiled at the meeting, five are COA Tier 1 pollutants (PCBs, chlordane, DDT, toxaphene and hexachlorobenzene).

COA Target: Improvements in and integration of existing air toxic data networks and management systems to track the deposition of contaminants within the Great Lakes Basin Ecosystem will support these international negotiations.

MOEE convened a series of meetings to discuss environmental inventories and the possibility of putting inventories of all environmental compartments on a similar basis. All agencies involved in the Great Lakes Air Toxics Program are using a newly established protocol for quality assurance purposes, which means data are available for unified interpretation efforts.

The Atmospheric Environment Service of Environment Canada and ORTECH Int. have established the Canadian Global Emissions Inventory Centre as a component of the International Global Atmospheric Chemistry project of the United Nations Environment Program. As part of this effort, AES and ORTECH collaborated to prepare a preliminary Canadian pesticide emissions inventory.

OBJECTIVE 3 CONSERVE AND PROTECT HUMAN AND ECOSYSTEM HEALTH

LAKEWIDE PLANNING

COA Targets: Develop ecosystem-based principles, objectives and indicators for Lake Ontario by 1995, Lake Superior by 1996, and Lake Erie by 1996, and Lake Huron by 2000 to provide direction for management plans.

Develop Stage I LaMPs for critical pollutants for Lake Superior by 1995, Lake Ontario by 1995 and for Lake Erie by 1998 for consideration by the IJC.

Develop Stage II LaMPs for critical pollutants for Lake Superior by 1996, Lake Ontario by 1997 and for Lake Erie by 2000 for consideration by the IJC.

LAKEWIDE PLANNING COMPONENTS

	Lake Ontario	Lake Erie	Lake Superior	Lake Huron
Principles				
Objectives				
Indicators				
Problem definition				
Load reductions and ecosystem targets				
Remedial measures				
Restoration				

Lake Superior

The Lake Superior Stage 1 and Stage 2 LaMP documents are examples of the cooperation and consensus that exist between Canadian and U.S. government agencies, and with members of the public and other interest groups.

GREAT LAKES USE IMPAIRMENT

Use Impairment	Lake Ontario ¹	Lake Erie	Lake Superior	Lake Huron ²
Restrictions on fish and wildlife consumption				
Tainting of fish and wildlife flavour				
Degradation of fish and wildlife populations				
Fish tumors and other deformities				
Bird or animal deformities or reproduction problems				
Degradation of benthos				
Restrictions on dredging activities				
Eutrophication or undesirable algae				
Restrictions on drinking water consumption, or taste and odour problem				
Beach closings				
Degradation of aesthetics				
Added costs to agriculture or industry				
Deregulation of phytoplankton and zooplankton populations				
Loss of fish and wildlife habitat				

The Stage 1 Lakewide Management Plan (LaMP) – the problem definition – is completed and incorporates public comment. A draft Stage 2 document will be released for comment in the fall of 1995.

The Stage 2 draft document includes lakewide reduction targets for many COA Tier 1 pollutants, as proposed by the Lake Superior Binational Forum. These targets are consistent with the basin-wide targets in COA and those proposed under the Binational Toxic Substances Strategy.

Lake Superior Binational Forum: Proposed COA Tier 1 Substance Reduction Targets

Mercury 60 per cent by 2000
80 per cent by 2010
VE by 2020

PCBs 33 per cent by 2000
60 per cent by 2005
95 per cent by 2010
VE by 2020

Pesticides Destroy banned
 pesticides by 2000

A binational Pollution Prevention Strategy is being finalized and will focus government and other activities on eliminating the targeted pollutants at source.

LAKE ONTARIO

The scope of the Lake Ontario Toxics Management Plan is being extended into a Lake Ontario LaMP. This will provide a more comprehensive, ecosystem-based approach to restoring lakewide impairments.

Identification and assessment of chemicals exceeding the most stringent criteria for water and fish was completed. The development of a Stage 1 LaMP is under way: Canada and Ontario have completed an assessment of beneficial use impairments in Canadian waters, and a study of the sources and loading of 18 Niagara River pollutants of concern. These are vital components of the eventual LaMP document. Agreement with the U.S. on the impaired beneficial uses and critical pollutants will be essential.

A preliminary assessment of the loss of fish and wildlife habitat on the Canadian side of Lake Ontario has been undertaken and is expected to be finalized in 1996. Ecosystem objectives and indicators have been defined for aquatic communities, wildlife, human health, habitat and stewardship.

LAKE ERIE

Canada and U.S. agency staff began work on the Lake Erie LaMP in 1994. Public consultation on LaMP development is being initiated through a partnership with the Lake Erie Conservation Authorities; input is being sought with respect to ecosystem goals, objectives and public concerns. Canada has prepared information materials in support of this process.

A background report is being developed to provide the basic information on the status of the ecosystem prior to categorizing the critical pollutants or ecosystem stressors.

Michigan and Ontario have agreed to undertake a joint examination of several impacts (swimming and aesthetics) upstream of Lake Erie in Lake St. Clair, and to consider the implementation of actions to resolve these local upstream issues. Downstream of Lake Erie, pollutant loadings from Lake Erie that may cause concern in the Niagara River will be assessed and addressed where feasible.

HABITAT CONSERVATION AND PROTECTED AREAS

COA Target: Implement the Great Lakes Wetlands Conservation Action Plan in 1994 to protect coastal and basin wetlands.

WETLAND AREA SECURED SINCE 1994

Site Name	Site Location	Number of Hectares
Port Franks	Ipperwash, Lake Huron	80
Turkey Point	Long Point Bay, Lake Erie	13
Mud Lake	Napanee, Lake Ontario	219
Minesing Swamp	West of Barrie	198
Brockville Long Swamp	St. Lawrence River	66
Oshawa Second Marsh	Oshawa, Lake Ontario	123
Matchedash Bay	Severn Sound	22
Cash Bay	Lake Nipissing	90
Total		811

Implementation of the Great Lakes Wetlands Conservation Action Plan is well underway in 1995 with the objective of rehabilitating and protecting 6000 hectares of wetlands by the year 2000. The Nature Conservancy of Canada chairs the implementation committee which has representation from Environment Canada, the Ontario Ministry of Natural Resources and the Federation of Ontario Naturalists.

The Natural Heritage Information Centre provides information on rare species and communities in these wetlands, and develops biomonitoring methodologies to measure the health of these ecosystems. The Centre also provides information on other sites being considered for acquisition.

More than 810 hectares at eight wetland sites have been secured. Seven sites were secured through the Eastern Habitat Joint Venture of the North American Waterfowl Management Plan and other partners. One site, Oshawa Second Marsh, involved title transfer from federal to local government.

A workshop to develop strategies for securing other sites was held in March, 1995. Forty-nine individuals, experienced in the designation and securement of environmentally sensitive areas, attended and reached consensus on immediate priorities for action. Eighteen priority sites have been identified and securement activities are ongoing. Target sites include:

- Big Sandy Bay, Wolfe Island
- West Side Creek Marsh
- Amherst Island Marshes
- Canard River Marsh
- Bay of Quinte
- Dunnville Marsh
- Big Island Marsh
- Long Point Wetland Complex
- Cataraqui Marshes
- Rondeau Bay Marshes
- Fish Lake Wetland
- Lake St. Clair Marshes
- Huyck's Bay
- Oshawa Second Marsh
- Weller's Bay Wetland
- Port Franks Wetlands and Dunes
- West Lake Wetland
- Walpole Island

The Conservation Lands Act in Ontario, which provides for conservation covenants or easements, was amended in January, 1995. The amendments allow landowners and a broad range of government agencies, Conservation Authorities and charities to enter into agreements for the purposes of conservation and restoration or enhancement of land or wildlife. In addition, the Government of Canada announced in the February 1995 Budget the intention to amend the Income Tax Act to promote the donation of ecologically sensitive lands, covenants, easements and servitudes for conservation purposes. The provisions of such legislative amendments will enhance securement opportunities.

Also in 1995, the Government of Ontario issued a Comprehensive Set of Policy Statements. Through the policy statement on wetlands, provincially significant wetlands will receive protection through the municipal land use planning process. A draft "Wetland Environmental Impact Study Requirements: Technical Manual" has been prepared by the Ontario Ministry of Natural Resources and distributed to participants who attended information sessions held across the province to explain the application of environmental impact studies as they relate to wetlands.

To increase public awareness and commitment to protecting wetlands a number of communication initiatives have been undertaken:

- The development of a wetlands poster, fact sheet, and travelling displays,
- Production of materials for local projects such as the poster, newsletters and fact sheets available for the Oshawa Second Marsh,
- The implementation of a program involving volunteer-based marsh monitoring of birds and amphibians in 16 AOCs as well as in numerous other priority wetlands in the basin. Training kits were produced and distributed to all volunteers. The Long Point Bird Observatory, which coordinates the program, received support from the U.S. Great Lakes Protection Fund to extend the program such that observation routes for monitoring are now established in 40 Areas of Concern in Canada and the U.S. which have sufficient marsh habitat.

COA Target: Apply the principles of the Federal Policy for the Management of Fish Habitat with a goal of net gain in productive capacity of fish habitat basin-wide.

Fish habitat is included in the Comprehensive Set of Policy Statements referenced above. The Implementation Guideline was released in the spring of 1995, and a technical manual is being prepared. Both the guideline and technical manual will ensure that the principles contained in the Federal Policy are met.

COA Target: Secure a network of protected areas representative of terrestrial and aquatic natural areas in the Great Lakes basin by 1999.

Within the Canadian Great Lakes basin there are about 500 protected sites that cover approximately 730,000 hectares. These sites include national and provincial parks and conservation areas and sanctuaries but do not include municipal parks and other sites managed by non-government organizations such as the Nature Conservancy of Canada and Ducks Unlimited. This system continues to expand as priorities are brought forward and resources secured.

Three new sites were designated Provincial Nature Reserves by the Ontario Ministry of Natural Resources in 1994 under the Provincial Parks Act: Holland Landing Prairie (34 hectares), Nottawasaga Lookout (130 hectares) and West Sandy Island (266 hectares). Parks Canada has added a total of 510 hectares to two National Parks (Bruce Peninsula and the St. Lawrence Islands) and two Heritage Canals (Rideau Canal and Trent-Severn Waterway) in the basin.

Canada and U.S. agency staff have initiated an effort to establish a cluster biosphere reserve designation (under UNESCO's Man and the Biosphere Program) for the Lake Superior basin. Input from community groups is being sought for such a designation. A

directory of Canadian core protected areas has already been compiled, while an American version is still being prepared. In addition, Parks Canada has undertaken a resource analysis to identify representative marine areas as candidates for a National Marine Conservation Area. These Lake Superior activities also apply to the COA target (Objective 2) relating to special designation status for Lake Superior and Lake Nipigon.

Parks Canada is contacting landowners around national parks, introducing a heritage land trust approach that encourages compatible land use in these areas. Multi-partner studies and workshops with communities have been held around the Georgian Bay Islands, the St. Lawrence Islands, the Bruce Peninsula and Pukaskwa National Parks. In addition, a conference was supported to promote the Biosphere Program in the Niagara Escarpment and other areas.

The Ontario Ministry of Natural Resources is currently preparing a proposal for an Aquatic Ecosystem Classification to support aquatic ecosystem protection and management. A number of Ecological Land Classifications are now complete across the basin. Tools for spatial mapping of ecosystem units are being developed.

FISH AND WILDLIFE CONSERVATION

COA Target: Have biodiversity policies in place by 1996 designed to protect the function and structure of diverse, self-sustaining biological communities.

The "Canadian Biodiversity Strategy: Canada's Response to the Convention on Biological Diversity", developed by a federal/provincial/territorial working group, was tabled with the Canadian Council of Ministers of the Environment in November, 1994. Formal jurisdictional approvals are being obtained and activities in the Great Lakes Basin Ecosystem will be consistent with the aims of the Strategy.

The following initiatives have been undertaken:

- In June of 1995 the Canadian Botanical Conservation Network was opened at the Royal Botanical Garden in Hamilton to establish a national network of arboreta and botanical gardens for conservation and protection of plant species and genetic diversity. Information will be available on rare and endangered plant species and advice provided on plants appropriate for habitat rehabilitation.
- Work continues to develop ecozone-based biodiversity monitoring in the Carolinian zone as part of the national Ecological Monitoring and Assessment Network (EMAN).
- In 1994, citizen-based wildlife monitoring programs were coordinated by the new Wildlife Watchers Program. This program coordinates the Breeding Bird Survey, the Forest Bird Monitoring Program, the Marsh Monitoring Program, Hawk Watching, Amphibian Call Counts, the Ontario Nest Records Scheme and the Christmas Bird Count. Partners in the program include the Federation of Ontario Naturalists, Long Point Bird Observatory, Royal Ontario Museum, Ontario Ministry of Natural Resources, Ontario Field Ornithologists, and the Ontario Field Herpetologists. The list is expected to grow as the program develops.

The Wildlife Watchers Program was implemented to bring together many of the volunteer wildlife monitoring and conservation projects underway in the province, and to provide feedback and recognition to participants. Information collected through Wildlife Watchers Program projects assists in tracking changes in populations and identifying species at risk. At the same time, through additional promotion and feedback, Wildlife Watchers is helping to increase involvement and the effectiveness of volunteer monitoring efforts.

COA Target: Focus monitoring programs to measure success in achieving healthy diverse ecosystems.

Federal and provincial fish and wildlife monitoring and surveillance programs provide essential elements for tracking the success of LaMPs and RAPs and to determine the status of whole lakes. For example, basin-wide monitoring programs measure contaminants in fish; measure phytoplankton, zooplankton and benthic productivity in Lake Ontario and Lake Erie; monitor tumours in the lower lakes; assess reproductive success in lake trout; and provide information for the Long Range Transport of Air Pollutants program. Eggs from herring gulls and other fish-eating birds were analyzed from sites throughout the basin to track trends in contaminant levels at the top of the food web. As well, basin-wide populations of waterbirds (gulls, cormorants and terns) were assessed as part of the **Atlas of Colonial Waterbirds Nesting on the Canadian Great Lakes**.

Several contaminants monitoring programs have reported a reduction in the rate of decline for numerous compounds since the mid-to late 1980s. Currently, statistical analyses are being conducted on herring gull egg contaminants measured since the mid-1970s to determine if levels are decreasing at a slower rate than previously. The effects of reductions in the production and use of persistent organic compounds, weather patterns and changes in diet are being used to explain the trends.

One of the deep water cisco fish species has been discovered in Lake Ontario through the Ontario Ministry of Natural Resources monitoring program. This species was thought to have been extirpated from this lake. Similar programs in Lake Huron have shown signs of recovery in specific lake trout stocks, indicating that past efforts on rehabilitation of relic stocks have been fruitful. In Lake Superior, the Ministry is assessing the success of walleye rehabilitation measures in Nipigon Bay.

COA Target: *Develop and implement by 1997, joint federal and provincial action plans to control the introduction of undesirable species and mitigate the negative impacts of non-indigenous nuisance species such as zebra mussels and ruffe. The federal government will continue the control program on sea lamprey.*

The Canadian Coast Guard has been evaluating various options to control the potential introduction of exotic species into the lakes via ballast water exchange from shipping. A voluntary guideline for ocean-going vessels entering the lakes was introduced in 1989 and modified in 1991. This guideline is similar to U.S. regulation. The Canadian Coast Guard monitoring programs have found virtually full compliance with the guideline, but administers ongoing ballast water studies to ensure the accuracy of ship reporting. Such work is being undertaken in concert with U.S. authorities to monitor the effectiveness of current requirements. A binational roundtable was held in August, 1995 in Cleveland to review efforts to date. If the ongoing investigations indicate continuing problems, further options that include regulation will be considered. In this regard, legislative amendments to the Canada Shipping Act are being developed that will allow the introduction of regulations pertaining to ballast water.

The Canadian Coast Guard has supported a ballast water exchange study in the Welland Canal to evaluate the effectiveness of ballast exchange initiatives for reducing the potential for basin-to-basin exchange. Monitoring programs show that the voluntary approach has been successful.

The Canadian Coast Guard co-sponsored the Fifth International Annual Zebra Mussel (and other nuisance species) Conference in Toronto in February, 1995.

Since 1992, the Ontario Ministry of Natural Resources, in partnership with the Ontario Federation of Anglers and Hunters, has maintained proactive programs to increase the public's awareness of non-indigenous species and involve the public in slowing the spread of harmful exotics. The Invading Species Awareness Program for Ontario includes:

Invading Species Hotline – a province-wide, toll free information line (1-800-563-7711) for callers to request free literature and to report sighting of non-indigenous species.

Zebra Busters Boat Wash Tour – a travelling summer program that operates at high profile events to educate boaters about effective boat cleaning methods to slow the spread of water-borne exotics. The Zebra Buster crew offers free boat washes (and literature) to the public who are encouraged to view the information display that accompanies the wash station.

Project Purple – a travelling program offering free presentations and workshops to motivate communities to control the spread of purple loosestrife. A research component of the project assists in the implementation and monitoring of biological control of purple loosestrife.

Invading species alert display – an information display that is staffed at various shows and events. The display is available for loan to other organizers when it is not scheduled for an event. In 1995, with support from the Canadian Coast Guard, five copies of this popular display were produced for use by the Coast Guard in their travelling display vans.

Educational Videos – the two videos "Zebra Busters – Slowing the Invaders" and "Project Purple – how to stop purple loosestrife from destroying your wetlands" have been widely circulated in the province. Also, the videos are frequently aired on cable stations reaching more than 700,000 subscribers in 23 Ontario communities.

The Department of Fisheries and Oceans continues to undertake research on alternatives to control chemicals for the problem of sea lamprey.

HUMAN HEALTH

COA Targets: Protect and promote human health through education, long term monitoring and stewardship.

By 2000, 70 per cent of the population will be knowledgeable about five key environmental health issues and how to reduce their risk.

By 2000, achieve for the general population a 30 per cent reduction in human health risks associated with exposure to environmental contaminants.

By 2000, 80 per cent of the population will have significantly increased their understanding and taken action in order to protect their health through involvement in environmental stewardship.

As a tool to measure a 30 per cent reduction in human health risks, Health Canada has developed three indicators of human health risks associated with environmental contamination. Two additional indicators are nearing completion. Data collection and analysis has begun for reporting on the following five indicators: drinking water, air, radionuclides (previous three completed), recreational water, and fish. The next biennial report on this initiative will be published in March, 1996.

To support the development of the indicators, two studies are under way to identify community-based air indicators, and to assess various methods of measuring bacterial contamination of recreational waters at several beaches around Grand Bend on Lake Huron.

A multi-media, multi-focus health promotion strategy has also been launched. The purpose of this strategy is to assist in educating the public about health issues and how to reduce risk. The latest health and environment information and advice is being provided to the general public and target groups through a range of media. A scientific document together with summary information and fact sheets will be available by the end of 1995. Health information is also included in the videos and outreach programs of TVOntario's "Great Lakes Alive" series.

Health and environment resource materials are being prepared and distributed to kindergarten, intermediate and senior grade teachers. Health monitoring is being included in a Toronto-area school.

Health Canada has formulated criteria and procedures to meet the human health objectives established in the Lake Superior LaMP. Similar work on the Lake Erie LaMP is ongoing .

To assist citizens in protecting their health through stewardship activities, Health Canada conducted a stewardship survey in October, 1994 in Ontario to establish baseline knowledge of population behaviour. The results are being assessed and three stewardship indicators will be developed as a result of this survey.

A workshop was held in June, 1995 to define a social science research agenda related to environmental health action. Products of the workshop include a report from which areas for sociological research will be identified in the fall of 1995.

CLIMATE CHANGE

COA Target: Identify the most likely impacts of climate variability and change on the Great Lakes Basin Ecosystem (for example, on human or ecosystem health or water and land use management) and develop and promote adaptive response strategies to reduce vulnerability.

The following activities were undertaken:

- A satellite tracking station was established by the National Water Research Institute (Environment Canada). The information from this facility will be combined with historical ground-based data, other remote sensing data and the results from planned climate-change studies to evaluate the sensitivity and vulnerability of the Great Lakes basin to climate change, and to assess adaptation strategies.
- A study was undertaken to document the nature of historical farming adaptations and to predict adaptations for the future.
- The Department of Fisheries and Oceans developed a climate change model that illustrates potential changes in distribution and abundance of fish species under various climate scenarios.

LAND AND WATER USE MANAGEMENT

COA Target: Implement water efficiency initiatives to reduce per capita water use in the Great Lakes basin.

The following activities were undertaken:

- The federal and Ontario governments are reducing water and energy use in government buildings. For example, a building audit of the Canada Centre for Inland Waters in Burlington resulted in significant process modifications for both water and energy use. Retrofits to water and energy facilities will eventually yield a savings of \$150 thousand per year in utility costs. Water-efficient fixtures and fittings will be installed in future alterations/repairs to Ontario government facilities, and in new buildings.
- Ontario has established the Municipal Assistance Program to provide funding for water infrastructure optimization and expansion. The program, administered by the Ontario Clean Water Agency, encourages municipalities to incorporate water efficiency as a requirement for funding, where appropriate. The program also funds water efficiency studies.

- Water efficiency strategies being implemented in Barrie are being analyzed to determine the benefits of water efficiency. Results are anticipated in early 1996.
- A “Best Management Practices: Water Management” document has been produced for farmers by Agriculture and Agri-Food Canada and the Ontario Ministry of Agriculture, Food and Rural Affairs under the Canada-Ontario Environmental Sustainability Accord Respecting the Agri-Food Sector (COESA).

COA Target: Develop and adopt an ecosystem-based planning process to integrate land use and water management by 1997.

In 1993, the Ontario Ministry of Natural Resources and the Ontario Ministry of Environment and Energy released three guideline documents on watershed planning – **Water Management on a Watershed Basis: Implementing an Ecosystem Approach; Subwatershed Planning; and Integrating Water Management Objectives into Municipal Planning Documents**. These documents are intended to assist community-based planning efforts involving watersheds and to provide a consistent application of provincial programs. The documents were released for voluntary application of watershed management planning throughout the province, for a two year interim period.

Severn pilot studies were initiated to test the advice and overall direction provided in the watershed planning guidelines. The project sites were chosen based on a variety of resource management issues in both rural and urban areas of southern and central Ontario. The pilot projects are: Chippewa Creek Watershed Management Study; Nottawasaga Valley Watershed Plan; Stoney Creek Subwatershed Plan Study; Mill Creek Subwatershed Study; Credit River – Subwatershed #19; Lovers/Hewitts Creeks Subwatershed; and the Jock River Watershed Plan.

Stakeholder forums were held in October 1994 and February 1995 which brought together a broad spectrum of interests, including local government, land owners, agricultural producers, developers and environmentalists, as well as planners and resource managers.

A recent survey of watershed planning activities indicated that approximately 70 watershed/subwatershed plans have been initiated since 1990 with a notable increase in effort over the last two years.

The experience and knowledge gained over the last two years through the pilot projects, stakeholder input and supporting science development activities are currently being evaluated. Findings and recommended directions for further refinement and application of the watershed approach will be brought forward in late 1995.

Also contributing to this target are activities to reduce the presence of pesticide residues in watersheds. Through Foodsystems 2002 research grants, the Ontario Ministry of Agriculture, Food and Rural Affairs supports research to develop integrated pest management practices and effective alternatives to chemical pesticide use for agriculture. The Ministry presently has integrated pest management programs for 22 different commodities, including various field crops, field vegetables, greenhouse vegetables, and fruit crops.

COA Target: Focus demonstration projects for ecosystem-based practices to reduce stresses to land, water and biota.

Agriculture and Agri-Food Canada has supported the establishment of 40 Rural Conservation Clubs to promote the exchange and evaluation of ideas on environmentally sustainable agricultural practices. In addition, ten demonstration and extension projects are being funded to illustrate the benefits of wetlands/woodlands/wildlife to sustainable agriculture.

Through ongoing advisory services of the Ministry of Agriculture, Food and Rural Affairs, as well as COESA programs, conservation tillage and management practices to reduce nutrient and bacterial loadings have been promoted.

COA Target: Support the development and implement of Environmental Farm Plans.

The farmer-led Environmental Farm Plan (EFP) initiative is an example of cooperation between non-government agencies and the federal and provincial governments. The EFP program is led by the Ontario Farm Environmental Coalition (Ontario Federation of Agriculture, Christian Farmers' Federation of Ontario, AGCare, and the Ontario Farm Animal Council, in consultation with other Ontario farm organizations), funded by Agriculture and Agri-Food Canada, with technical support provided by a number of agencies including the Ontario Ministry of Agriculture, Food and Rural Affairs. Local delivery of the program is by the Ontario Soil and Crop Improvement Association.

Since the fall of 1992, close to 5000 participants have attended Environmental Farm Plan Workshops. The workshops assist farmers in identifying potential environmental risks on their farms and in developing realistic plans to address these risks.

APPENDIX I

INFORMATION SOURCES ON GREAT LAKES ACTIVITIES

Canada-Ontario Agreement respecting the Great Lakes Basin Ecosystem (Governments of Canada and Ontario, July 1994)

Canadian Great Lakes Program – Overview; Third Report of Canada under the 1987 Protocol to the 1978 Great Lakes Water Quality Agreement (Government of Canada, October 1993)

Great Lakes 2000 Cleanup Fund – Project Highlights of the Fish and Wildlife Habitat Rehabilitation Program (Environment Canada, January 1995)

Great Lakes Cleanup Fund – Project Summaries as of November 1994 (Environment Canada, November 1994)

Great Lakes Fact Sheets (Environment Canada):

The Fall and Rise of Osprey Populations in the Great Lakes Basin (1994)

The Rise of the Double-crested Cormorant on the Great Lakes: Winning the War Against Contaminants (1995)

Sustaining Wetlands in the Great Lakes Basin (1995)

Ontario Report of Progress from 1991 on the Great Lakes (Government of Ontario, October 1993)

Overview of Research Conducted by the National Water Research Institute in Support of the Great Lakes Action Plan, 1989-1994 (NWRI Contribution No. 94-01, Environment Canada, 1994)

State of the Environment Report for Canada (both printed and Internet versions) will be published by the Government of Canada in mid-1996. This report will contain a chapter on the Great Lakes which will also be available in a CD-ROM format

State of the Great Lakes Report (Governments of Canada and the United States, July 1995) includes six appendices:

A Changing Great Lakes Economy: Economic and Environmental Linkages

Aquatic Community Health of the Great Lakes

Aquatic Habitat and Wetlands of the Great Lakes

Nutrient Trends and System Response

Toxic Contaminants in the Great Lakes

Effects of Great Lakes Basin Environmental Contaminants on Human Health

The Great Lakes – An Environmental Atlas and Resource Book (Government of Canada and the United States Environmental Protection Agency, 3rd edition, 1995)

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